

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A liquid crystal display element in a projection type liquid crystal display unit, comprising a reflection substrate, a transparent substrate, and a liquid crystal layer interposed between said two substrates, wherein a plurality of pixels and active elements for driving the liquid crystal at the plurality of pixels, are incorporated ~~to-in~~ at least one of the two substrates, ~~characterized in that an optical axis of an incident light beam upon the liquid crystal layer and an optical axis of an emergent light beam from the liquid crystal layer are present in a plane which is substantially perpendicular to a direction of orientation of liquid crystal molecules on the two substrates, the incident light and wherein a projection light beam is incident upon and emergent from the liquid crystal layer through the transparent substrate, in directions which lie in a plane which is substantially perpendicular to a direction of orientation of the liquid crystal molecules at at least one of the two substrates, the projection light beam being modulated by the liquid crystal molecules, and the light beam impinges upon the liquid crystal layer in a direction which is inclined by a predetermined angle to the-a direction of the-a normal line of the substrate, and a direction of polarization of the incident light beam upon the liquid crystal layer is substantially perpendicular or parallel to the direction of the orientation of the liquid crystal molecules.~~

Claim 2 (canceled)

3. (previously presented) A liquid crystal display element as set forth in claim 1, characterized in that the orientation of the liquid crystal molecules in the liquid crystal layer is homogeneous.

4. (previously presented) A liquid crystal display element as set forth in claim 1, characterized in that the orientation of the liquid crystal molecules in the liquid crystal layer is homeotropic.

5. (currently amended) A liquid crystal display element as set forth in claim 3, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of the substrate is set to be larger than a total reflection angle upon emanation of the light beam from the substrate into the air.

6. (currently amended) A liquid crystal display element as set forth in claim 4, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of the substrate is set to be larger than a total reflection angle upon emanation of the light beam from the substrate into the air.

7. (currently amended) A liquid crystal display element as set forth in claim 3, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of

the substrate is set to be not less than a Brewster angle between the substrate and the air.

8. (currently amended) A liquid crystal display element as set forth in claim 4, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of the substrate is set to be not less than a Brewster angle between the substrate and the air.

9. (Original) A liquid crystal display element as set forth in claim 3, further comprising a hologram element for the pixels, characterized in that the hologram element is configured so that a p-polarized light beam is not substantially diffracted, but an s-polarized light beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

10. (Original) A liquid crystal display element as set forth in claim 4, further comprising a hologram element for the pixels, characterized in that the hologram element is configured so that a p-polarized light beam is not substantially diffracted, but an s-polarized light beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

11. (Original) A liquid crystal display element as set forth in claim 3, characterized in that diffraction grating is provided for the pixels, an s-polarized light

beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

12. (Original) A liquid crystal display element as set forth in claim 4, characterized in that diffraction grating is provided for the pixels, an s-polarized light beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

13. (Currently Amended) A liquid crystal display element as set forth in claim 1, characterized in that the liquid crystal layer is driven by an electric field component which is mainly parallel to the substrate;

switching is made between directions of orientation of the liquid crystal molecules in two states;

the ~~an~~ optical axis of the incident light beam upon the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and

the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by ~~an~~ the predetermined angle to the direction of the normal line of the substrate.

14. (Currently Amended) A liquid display element as set forth in claim 1, characterized in that a ferroelectric liquid crystal material is used as a liquid crystal material from which the liquid crystal layer is formed;

switching is made between directions of orientation of the liquid crystal molecules in two states;

~~the an~~ optical axis of the incident light beam onto the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and

the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by ~~an the~~ predetermined angle to the direction of the normal line of the substrate.

15. (Currently Amended) A liquid display element as set forth in claim 1, characterized in that an antiferroelectric liquid crystal material is used as a liquid crystal material from which the liquid crystal layer is formed;

switching is made between directions of orientation of the liquid crystal molecules in two states;

~~the an~~ optical axis of the incident light beam onto the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and

the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by ~~an the~~ predetermined angle to the direction of the normal line of the substrate.

16. (Currently Amended) A liquid crystal display element in a projection type liquid crystal display unit, comprising two transparent substrates and a liquid crystal layer interposed between ~~said the~~ two substrates, wherein a plurality of pixels and active elements for driving liquid crystal molecules in the liquid crystal layer at the plurality of pixels, are incorporated to at least one of the two substrates, ~~characterized in that an optical axis of an incident~~ wherein a projection light beam is

incident upon and emergent from the liquid crystal layer and an optical axis of an emergent light beam from the liquid crystal layer are present through at least one of the two substrates, in directions which lie in a plane which is substantially perpendicular to a direction of orientation of liquid crystal molecules on at least one of the two substrates, the incident light beam being modulated by the liquid crystal molecules, and the light beam impinges upon the liquid crystal layer in a direction which is inclined by a predetermined angle to the a direction of the a normal line to at least one of the substrate two substrates, and a direction of polarization of the incident light beam upon the liquid crystal layer is substantially perpendicular or parallel to the direction of the orientation of the liquid crystal molecules.

Claim 17 (canceled)

18. (previously presented) A liquid crystal display element as set forth in claim 16, characterized in that the orientation of the liquid crystal molecules in the liquid crystal layer is homogeneous.

19. (previously presented) A liquid crystal display element as set forth in claim 16, characterized in that the orientation of the liquid crystal molecules in the liquid crystal layer is homeotropic.

20. (currently amended) A liquid crystal display element as set forth in claim 18, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line

of the ~~substrate~~ at least one of the two substrates is set to be larger than a total reflection angle upon emanation of the light beam from the substrate into the air.

21. (currently amended) A liquid crystal display element as set forth in claim 19, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of the ~~substrate~~ at least one of the two substrates is set to be larger than a total reflection angle upon emanation of the light beam from the substrate into the air.

22. (currently amended) A liquid crystal display element as set forth in claim 18, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of the ~~substrate~~ at least one of the two substrates is set to be not less than a Brewster angle between the substrate and the air.

23. (currently amended) A liquid crystal display element as set forth in claim 19, characterized in that an angle between an optical axis of ~~an optical path~~ the incident light beam in the liquid crystal layer and the direction of the normal line of the ~~substrate~~ at least one of the two substrates is set to be not less than a Brewster angle between the substrate and the air.

24. (Original) A liquid crystal display element as set forth in claim 18, further comprising a hologram element for the pixels, characterized in that the hologram element is configured so that a p-polarized light beam is not substantially diffracted, but an s-polarized light beam which is generated after it is modulated by

the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

25. (Original) A liquid crystal display element as set forth in claim 19, further comprising a hologram element for the pixels, characterized in that the hologram element is configured so that a p-polarized light beam is not substantially diffracted, but an s-polarized light beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

26. (Original) A liquid crystal display element as set forth in claim 18, characterized in that diffraction grating is provided for the pixels, an s-polarized light beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

27. (Original) A liquid crystal display element as set forth in claim 19, characterized in that diffraction grating is provided for the pixels, an s-polarized light beam which is generated after it is modulated by the liquid crystal layer is diffracted to a direction which is substantially perpendicular to the liquid crystal element.

28. (currently amended) A liquid crystal display element as set forth in claim 18, further comprising hologram elements before and after the liquid crystal layer,

the incident side hologram element diffracts the incident light beam which impinges upon the ~~substrate~~ at least one of the two substrates in a direction which is



substantially perpendicular to the substrate so as to allow the incident light beam to impinge upon the liquid crystal layer,

meanwhile the emergent side hologram element diffracts an emergent light beam from the liquid crystal layer into a direction which is substantially perpendicular to the ~~substrate~~ at least one of the two substrates,

the incident side hologram element diffracts the polarized incident light; and

the emergent side hologram element diffracts the emergent light beam having a polarization which is orthogonal to the polarization of the incident light beam.

29. (currently amended) A liquid crystal display element as set forth in claim 19, further comprising hologram elements before and after the liquid crystal layer,

the incident side hologram element diffracts the incident light beam which impinges upon the ~~substrate~~ at least one of the two substrates in a direction which is substantially perpendicular to the substrate so as to allow the incident light beam to impinge upon the liquid crystal layer,

meanwhile the emergent side hologram element diffracts the emergent light beam from the liquid crystal layer into a direction which is substantially perpendicular to the ~~substrate~~ at least one of the two substrates,

the incident side hologram element diffracts the polarized incident light beam; and

the emergent side hologram diffracts the emergent light beam having a polarization which is orthogonal to the polarization of the incident light beam.

30. (currently amended) A liquid crystal display element as set forth in claim 18, characterized in that the liquid crystal layer is driven by an electric field component which is mainly parallel to the ~~substrate~~ at least one of the two substrates,

switching is made between directions of orientation of the liquid crystal molecules in two states,

the optical axis of the incident light beam onto the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and

the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by an predetermined angle to the direction of the normal line of the ~~substrate~~ at least one of the two substrates.

31. (currently amended) A liquid crystal display element as set forth in claim 19, characterized in that the liquid crystal layer is driven by an electric field component which is mainly parallel to the ~~substrate~~ at least one of the two substrates,

switching is made between directions of orientation of the liquid crystal molecules in two states,

the optical axis of the incident light beam upon the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by an predetermined angle to the direction of the normal line of the ~~substrate~~ at least one of the two substrates.

32. (Currently Amended) A liquid display element as set forth in claim 17, characterized in that a ferroelectric liquid crystal material is used as a liquid crystal material from which the liquid crystal layer is formed,

switching is made between directions of orientation of the liquid crystal molecules in two states,

the optical axis of the incident light beam onto the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by an predetermined angle to the direction of the normal line of the ~~substrate~~ at least one of the two substrates.

33. (currently amended) A liquid display element as set forth in claim 16, characterized in that an antiferroelectric liquid crystal material is used as a liquid crystal material from which the liquid crystal layer is formed,

switching is made between directions of orientation of the liquid crystal molecules in two states,

the optical axis of the incident light beam onto the liquid crystal layer is present in a plane which is substantially perpendicular to one of the directions of the orientation of the liquid crystal molecules in the two states; and the incident light beam impinges upon the liquid crystal layer in a direction which is inclined by an predetermined angle to the direction of the normal line of the ~~substrate~~ at least one of the two substrates.

34. (currently amended) A display unit characterized by a light source, a color separation optical system for monochromatically separating a white light beam from the optical source, and liquid crystal display elements as set forth in claim 1, corresponding respectively to three primary colors, and characterized in that three primary color beams which are monochromatically separated by the color separation optical system have optical axes which are incident upon the respective liquid crystal display elements, in directions oblique to the liquid crystal display elements,

there are provided a chromatically synthesizing emergent light beams emanating from the liquid crystal display elements, and a projection lens for projecting ~~a the~~ light beam which is chromatically synthesized by the chromatically synthesizing optical system.

35. (currently amended) A display unit characterized by a light source, a color separation optical system for monochromatically separating a white light beam from the optical source, and liquid crystal display elements as set forth in claim 16, corresponding respectively to three primary colors, and characterized in that three primary color beams which are monochromatically separated by the color separation optical system have optical axes which are incident upon the respective liquid crystal display elements, in directions oblique to the liquid crystal display elements,

there are provided a chromatically synthesizing emergent light beams emanating from the liquid crystal display elements, and a projection lens for projecting ~~a the~~ light beam which is chromatically synthesized by the chromatically synthesizing optical system.

36. (Original) A display unit as set forth in claim 33, characterized in that the optical axis of the light source and the optical axis of the projection lens are laid at different levels, being parallel to each other or being twisted to one another by an angle of about 90 deg., and optical prisms which can change the optical axes are arranged on optical paths of the color separation optical system and the liquid crystal display elements.

37. (Original) A display unit as set forth in claim 34, characterized in that the optical axis of the light source and the optical axis of the projection lens are laid at different levels, being parallel to each other or being twisted to one another by an angle of about 90 deg., and optical prisms which can change the optical axes are arranged on optical paths of the color separation optical system and the liquid crystal display elements.

38. (new) A liquid crystal display element as set forth in claim 16, wherein the light beam which is incident upon the liquid crystal layer passes through one of the two substrates before being incident upon the liquid crystal layer, and the light beam which is emergent from the liquid crystal layer passes through the one of the two substrates after being modulated by the liquid crystal molecules.